

HE
18.5
.A34
no.
DOT-
TSC-
NHTSA-
80-24

✓
PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES
IN THE UNITED STATES

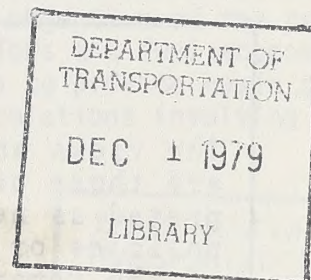
Third Series - Report No. 12
1978 Ford 140 CID (2.3 Liters), 2V

D.E. Koehler
W.F. Marshall

U.S. DEPARTMENT OF ENERGY
BARTLESVILLE ENERGY TECHNOLOGY CENTER
P.O. Box 1398
Bartlesville OK 74003



SEPTEMBER 1980
INTERIM REPORT



DOCUMENT IS AVAILABLE TO THE PUBLIC
THROUGH THE NATIONAL TECHNICAL
INFORMATION SERVICE, SPRINGFIELD,
VIRGINIA 22161

Prepared for
U.S. DEPARTMENT OF TRANSPORTATION
NATIONAL HIGHWAY TRAFFIC SAFETY ADMINISTRATION
Office of Research and Development
Washington DC 20590

NOTICE

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its contents or use thereof.

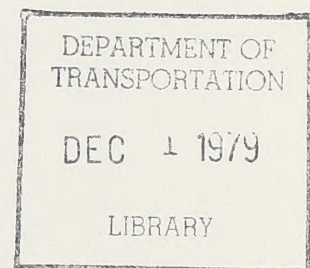
NOTICE

The United States Government does not endorse products or manufacturers. Trade or manufacturer's names appear herein solely because they are considered essential to the object of this report.

NOTICE

The views and conclusions contained in the document are those of the author(s) and should not be interpreted as necessarily representing the official policies or opinions, either expressed or implied, of the Department of Transportation.

1. Report No. DOT-HS-805 540	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle PERFORMANCE CHARACTERISTICS OF AUTOMOTIVE ENGINES IN THE UNITED STATES, Third Series - Report No. 12, 1978 Ford 140 CID (2.3 Liters), 2V		5. Report Date September 1980	
		6. Performing Organization Code	
7. Author(s) D. E. Koehler and W. F. Marshall		8. Performing Organization Report No. BETC/OP-79/2 DOT-TSC-NHTSA-80-24	
9. Performing Organization Name and Address U.S. Department of Energy* Bartlesville Energy Technology Center P.O. Box 1398 Bartlesville, OK 74003		10. Work Unit No. (TRAIS) HS053/R0148	
		11. Contract or Grant No. RA-77-07	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration, Office of Research and Development, Office of Passenger Vehicle Research Technology Assessment Division Washington DC 20590		13. Type of Report and Period Covered April 1979 Interim Report	
		14. Sponsoring Agency Code	
15. Supplementary Notes *Interagency agreement with:		U.S. Department of Transportation Research and Special Programs Administration Transportation Systems Center Kendall Square, Cambridge MA 02142	
16. Abstract Experimental data were obtained in dynamometer tests of a 1978 Ford 140 CID engine to determine fuel consumption and emissions (hydrocarbon, carbon monoxide, oxides of nitrogen) at steady-state engine operating modes. The objective of the program is to obtain engine performance data for estimating emissions and fuel economy for varied engine service and duty. The intent of the work is to provide basic engine characteristic data required as input for engineering calculations involving ground transportation.			
17. Key Words Fuel Economy Auto Emissions		18. Distribution Statement DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22161	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 60	22. Price



PREFACE

This report, prepared by the U.S. Department of Energy, Bartlesville Energy Technology Center for the U.S. Department of Transportation, Transportation Systems Center, Energy Technology Branch, Cambridge MA, presents results of experimental work to obtain information on performance characteristics of an engine used in automobiles sold in the United States.

This project is funded by the National Highway Traffic Safety Administration, Office of Research and Development, Office of Passenger Vehicle Research, Technology Assessment Division.

James A. Kidd, Jr. of the U.S. Department of Transportation, Transportation Systems Center, is the technical monitor.

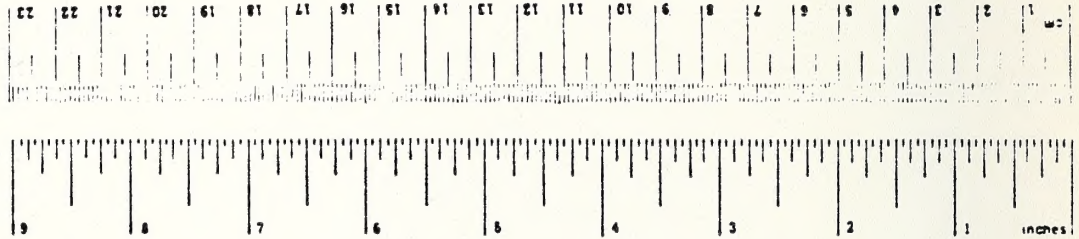
METRIC CONVERSION FACTORS

Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	meters	m
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.09	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.6	acres	ac
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	ton
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.76	gallons	gal
m ³	cubic meters	35	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



© 1991 by The McGraw-Hill Companies, Inc. All rights reserved. Printed in the United States of America. This book is a trademark of The McGraw-Hill Companies, Inc.

1. INTRODUCTION

The objective of this program is to obtain engine performance data for estimating fuel economy and emissions for varied engine service and duty. The intent of work done at the Bartlesville Energy Technology Center is to provide basic engine characteristic data required as input for engineering calculations of fuel consumption and emissions involving ground transportation.

The data acquired from tests of a 1978 Ford 140-CID engine are presented in this report. Ford uses the 140-CID engine as equipped in a Pinto which is in the 2,750 lb inertia weight class. The engine as equipped is intended for use in a California vehicle with automatic transmission. The test results are sufficient to establish steady-state maps for fuel consumption and emissions (carbon monoxide, unburned hydrocarbon, and oxides of nitrogen) over the entire operating range of the engine.

2. ENGINE TEST REPORT

The engine test setup included a complete engine (SAE definition) coupled to an eddy-current dynamometer. A cooling tower was used in the place of the fan and radiator. The alternator was included but was not wired into the engine's electrical system.

The emission control system consists of a dual catalytic converter (the upstream half of the catalyst is a 3-way catalyst, and the other half is a conventional oxidation catalyst) with feedback control monitoring the exhaust oxygen concentration and controlling the fuel flow to produce a stoichiometric exhaust mixture. The control loop consists of a zirconium dioxide sensor to measure oxygen concentration, an electronic control unit, a vacuum regulator to proportion a vacuum signal to the carburetor, and a carburetor with vacuum modulated main fuel system. The system also includes exhaust gas recirculation and an air-injection system that injects secondary air into the exhaust manifold when the coolant temperature is below 125° F and into the catalyst assembly just ahead of the conventional oxidation catalyst when the coolant temperature is above 125° F. The manufacturer's specifications for the 1978 Ford 140-CID engine are given in Table 1.

Prior to testing, engine break-in consisted of 40 hours of operation at various speeds/load modes representative of normal engine operation. Table 2 contains details of the break-in schedule. A single batch of unleaded regular grade gasoline was used throughout the break-in and tests; a detailed fuel analysis is given in table 3. Engine testing began on November 7, 1978, and ended on December 27, 1978.

During steady-state tests the engine was operated at the following speed/load modes:

Speeds: 1,000; 1,600; 2,200; 2,800; 3,300; 3,900; 4,400;
4,800 rpm

Loads: 0, 10, 25, 40, 60, 75, 90, 100 pct of full load
(0, 10, 25, 60, and 75 pct points were repeated
for all engine speeds)

Idle speed/load modes: 850 rpm -- 0, 10, 15 lb-ft
750 rpm -- 6 lb-ft

Over-speed mode: 5,000 rpm -- 86 lb-ft (wide-open-throttle)

Total number of test modes.....	68
Total number of repeats.....	45
Total number of tests.....	<u>113</u>

The following data were recorded for each test point:

Test number

Data source code (1 = before catalyst, 2 = after catalyst)

Date

Barometric pressure, mm Hg
 Wet bulb temperature, °F
 Dry bulb temperature, °F
 Inlet air temperature, °F
 Speed, rpm
 Torque, lb-ft -- Daytronic strain gauge load cell
 Fuel rate, lb/hr -- Fluidyne positive displacement fuel flow meter
 Ignition timing, °BTC
 Manifold vacuum, in. Hg
 Intake manifold pressure, in. Hg
 CO, pct -- Beckman NDIR
 CO₂, pct -- Beckman NDIR
 O₂, pct -- Beckman polarographic detector
 HC, ppmC -- Custom-built heated flame ionization detector
 NO_x, ppm -- Thermo-Electron chemiluminescent detector
 Oil temperature, °F
 Coolant temperature, °F
 Exhaust temperature, °F
 Exhaust pressure, in H₂O
 Intake manifold temperature, °F

The following equations were used in calculating power, air-fuel (A/F) ratio, absolute humidity, and mass emission rates of carbon monoxide (CO), unburned hydrocarbons (HC), and oxides of nitrogen (NO_x):

1. Partial pressure of water vapor in intake air (millimeters of mercury):

$$P = \exp \left[18.717 - \frac{7308.1}{393 + D} \right]$$

where D = Dew point, °F

2. Absolute humidity (grains moisture per pound dry air):

$$H = \frac{4347.8(P)}{B - P}$$

where B = Barometric pressure, mm Hg

3. Humidity correction factor (dimensionless):

$$K_H = \frac{1}{1 - 0.0047(H - 75)}$$

Note: This factor is used to correct the NO_x mass emission rate to a standard humidity of 75 grains moisture per pound dry air.

4. Hydrogen concentration in raw exhaust (percent):

$$H_2 = \frac{x(CO)(CO + CO_2)}{2(CO + 3CO_2)}$$

where CO = Carbon monoxide concentration (percent)

CO₂ = Carbon dioxide concentration (percent)

x = Fuel hydrogen/carbon atomic ratio

Note: This equation assumes a water-gas shift equilibrium constant:

$$\frac{(CO)(H_2O)}{(CO_2)(H_2)} = 3$$

5. Correction factor for emission concentrations from wet basis to dry basis (dimensionless):

$$C_w = 1 + \frac{(x/2)(CO + CO_2) - H_2}{100}$$

Note: In these tests only HC is measured on a wet basis.
All other species are measured on a dry basis.

6. Air-fuel ratio (dimensionless):

$$AF = \frac{68.9994}{MW_{fuel}} \left[\frac{(1 + \frac{x}{2} - y)(CO) + (2 + \frac{x}{2} - y)(CO_2) + 2(O_2) + \frac{NO_x}{10^4} - H_2}{CO + CO_2 + C_w(HC/10^4)} \right]$$

where O₂ = Oxygen concentration (percent)

NO_x = Oxides of nitrogen (ppm)

HC = Unburned hydrocarbon concentration (ppmC)

y = Fuel oxygen/carbon atomic ratio

MW_{fuel} = Fuel molecular weight per carbon atom

= 12.01115 + 1.00797x + 15.9994y

7. Carbon monoxide mass emission rate (grams per hour):

$$M_{CO} = \left(\frac{MW_{CO}}{MW_{fuel}} \right) \left[\frac{(\%CO)(M_f)}{\%CO + \%CO_2 + C_w(\%HC)} \right] (453.59237)$$

MW_{CO} = Molecular weight of CO (28.10155)

M_f = Fuel rate in lb/hour

%HC = HC(ppmC)/10⁴

8. Unburned hydrocarbon mass emission rate (grams per hour):

$$M_{HC} = \left(\frac{MW_{HC}}{MW_{fuel}} \right) \left[\frac{(\%HC)(M_f)(C_w)}{\%CO + \%CO_2 + C_w(\%HC)} \right] (453.59237)$$

MW_{HC} = Molecular weight of hydrocarbon per carbon atom
 $= 12.01115 + 1.00797x + 15.9994y$

9. Oxides of nitrogen mass emission rate (grams per hour):

$$M_{NO_x} = \left(\frac{MW_{NO_x}}{MW_{fuel}} \right) \left[\frac{(\%NO_x)(M_f)}{\%CO + \%CO_2 + C_w(\%HC)} \right] (453.59237) K_H$$

MW_{NO_x} = Molecular weight of NO_2 = 46.0055

$\%NO_x$ = $NO_x(\text{ppm})/10^4$

10. Power (brake horsepower corrected to a standard barometric pressure of 736.6 mm Hg and a standard temperature of 85° F):

$$HP = \left(\frac{(N)(T)}{5252.113} \right) \left(\frac{736.6}{B - P} \right) \sqrt{\frac{t + 460}{545}}$$

where N = Engine speed (revolutions per minute)

T = Brake torque (ft-lb)

t = Air temperature (°F)

3. DISCUSSION OF TEST RESULTS

Maximum corrected brake horsepower, maximum torque, and brake specific fuel consumption (bsfc) are plotted as functions of engine speed at wide-open-throttle (WOT) in figure 1. The maximum brake horsepower and the maximum torque produced by the engine were slightly lower than the values quoted in Table 1 (9 percent and 7 percent, respectively) but were produced at the specified speeds. Minimum bsfc occurred at 3,300 rpm, indicating a high efficiency mode at this speed.

The fuel rates were found to be nearly a linear function of power for most engine speeds except for the WOT load modes at some speeds where fuel-rich operation caused a significant increase in fuel rates (figure 2). Fuel rates were repeated for all speeds duplicated. The A/F ratio measured before the catalyst reflects the actual stoichiometry in the combustion chamber and remained between 14 and 16 for all modes except at WOT where the A/F ratio significantly decreased (Figure 3). The A/F ratio measured after the catalyst was significantly higher, due to the injection of secondary air into the catalyst to support the oxidation process of the conventional oxidation catalyst.

Both the before-catalyst and after-catalyst exhaust emissions of CO, HC, and NO_x are plotted as functions of power for all engine speeds (figures 4 thru 6). These figures indicate the engine emission levels and the effectiveness of the dual catalytic converter. The injection of secondary air into the catalyst assembly provided sufficient oxygen to support the oxidation process of the conventional oxidation catalyst. This effectively reduces the emissions of CO and HC at all modes except those modes at WOT.

4. CONCLUSIONS

The experimental work to obtain performance data for the Ford 140-CID engine has been completed; these data are presented in the tables accompanying this report.

TABLE 1. MANUFACTURER'S ENGINE SPECIFICATIONS

Displacement, cubic inches.....	140
Maximum horsepower, bhp @ 4,800 rpm.....	88
Maximum torque, lb-ft @ 2,800 rpm.....	118
Bore and stroke, inches.....	3.781 x 3.126
Configuration.....	Inline, 4-cyl- inder camshaft
Compression ratio.....	9 to 1
Firing order.....	1-3-4-2
Ignition timing at idle speed, BTCD @ 600 rpm.....	17°
Block material.....	Cast iron
Head material.....	Cast iron
Number of crankshaft main bearing.....	5
Number of compression rings/piston.....	2
Number of oil rings/piston.....	1
Cam drive type.....	Belt
Valve timing:	
Intake opens, °BTC.....	22
Intake closes, °ABC.....	66
Exhaust opens, °BBC.....	64
Exhaust closes, °ATC.....	24
Spark plug gap, inches.....	.034
Weight of engine, pounds.....	375
Crankcase emission control:	
Control method.....	Positive crankcase ventilation
Point of discharge.....	Carburetor spacer
Carburetor type.....	2-V, downdraft
Distributor specifications:	
Centrifugal advance, begins, ° @ 1,600 rpm.....	1
Centrifugal advance, intermediate, ° @ 3,000 rpm.....	5
Centrifugal advance, full, ° @ 5,000 rpm.....	13
Vacuum advance, begins, ° @ 2.3 in. Hg.....	0
Vacuum advance, maximum, ° @ 15.75 in. Hg.....	24
Carburetor number.....	D8EE-EA
Distributor number.....	D7EE-CA
Exhaust-gas-recirculation:	
Valve number.....	87EE-9D475-G2A
Valve type.....	Internal tapered stem
Point of exhaust injection.....	Carburetor spacer
Air injection system:	
Air pump type.....	Vane, constant displacement
Point of injection.....	Exhaust manifold and mixing chamber in dual catalytic converter

TABLE 2. ENGINE BREAK-IN SCHEDULE

Simulated vehicle speed, mph	Engine speed, rpm	Intake manifold vacuum, in. Hg	Fraction of time in mode
Idle	850	18.8	1/10
20	1,000	16.4	"
30	1,350	16	"
40	1,800	11.5	"
50	2,200	12	"
60	2,650	11	"
25	1,100	16.5	"
35	1,550	15.5	"
45	2,000	12.5	"
55	2,400	12	"

Mileage per cycle = 90 miles.

Total mileage accumulated over 40 hour break-in period = 1,440 miles.

TABLE 3. FUEL ANALYSIS

Fuel No.....	7718
Research octane No.....	91.8
Motor octane No.....	84.0
Specific gravity.....	0.717
API gravity, degrees.....	65.9
Distillation, °F:	
10 pct evaporated.....	123
50 pct ".....	209
95 pct ".....	402
100 pct ".....	413
Reid vapor pressure, psi.....	11.26
FIA analysis, pct:	
Aromatics.....	9
Olefins.....	15
Paraffins.....	76
Sulfur, pct.....	0.016
Lead, grams per gallon.....	Trace
Hydrogen/carbon atomic ratio.....	2.038

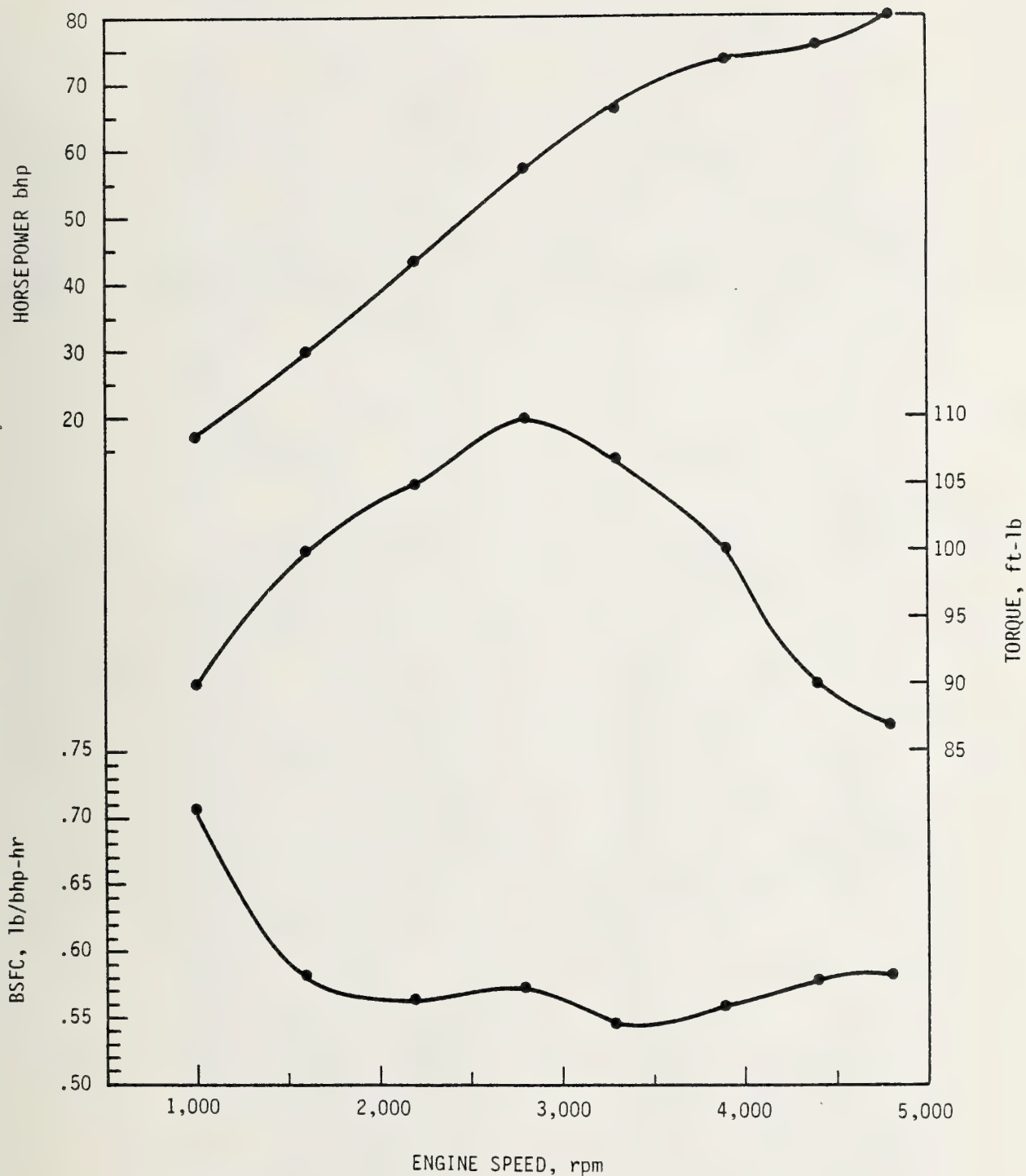


FIGURE 1. Brake Specific Fuel Consumption, Torque and Brake Horsepower Versus Engine rpm at Wide-Open-Throttle--Ford 140 CID Engine.

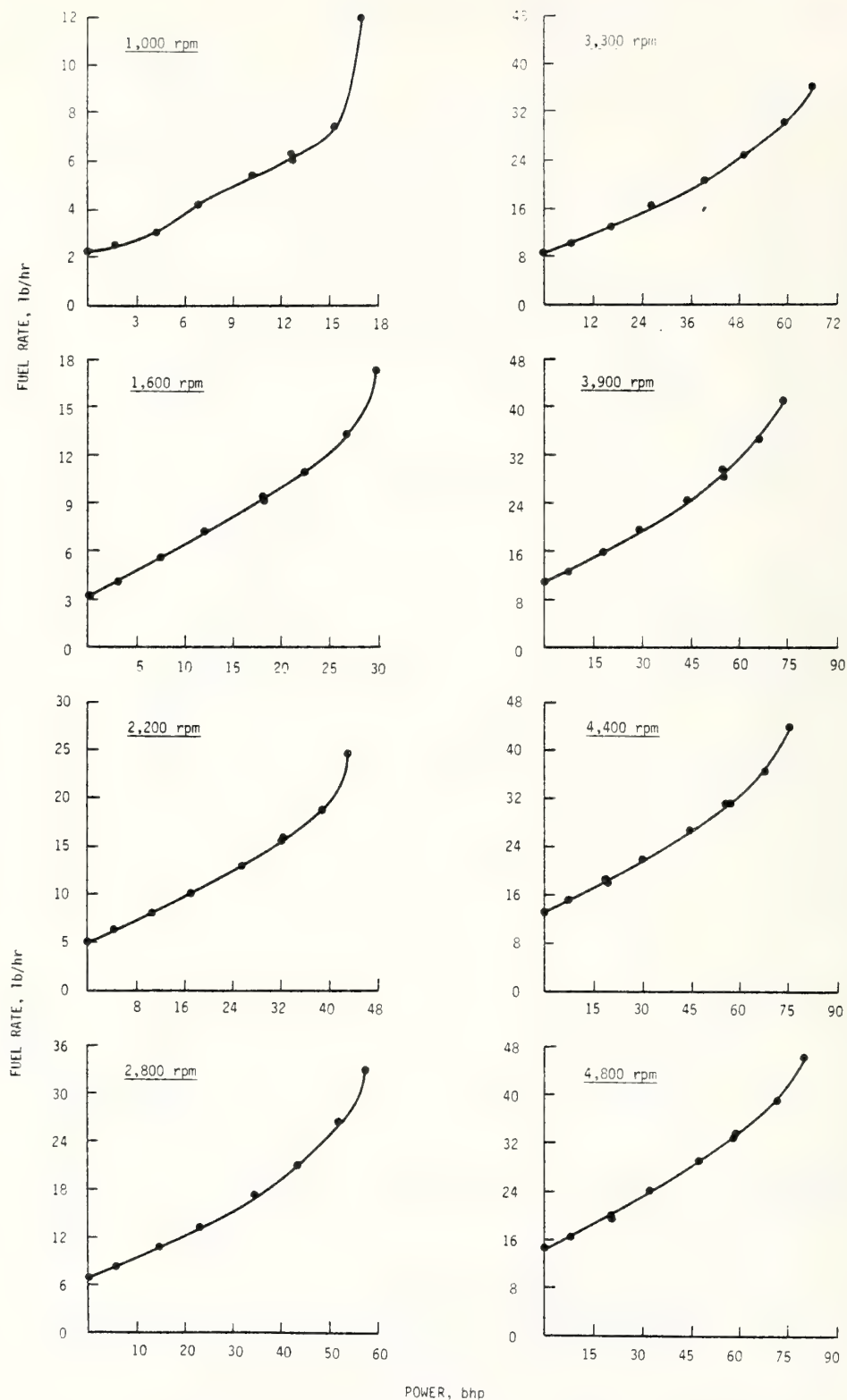


FIGURE 2. Fuel Rate Versus Power at Various Speed and Load Conditions--Ford 140-CID Engine.

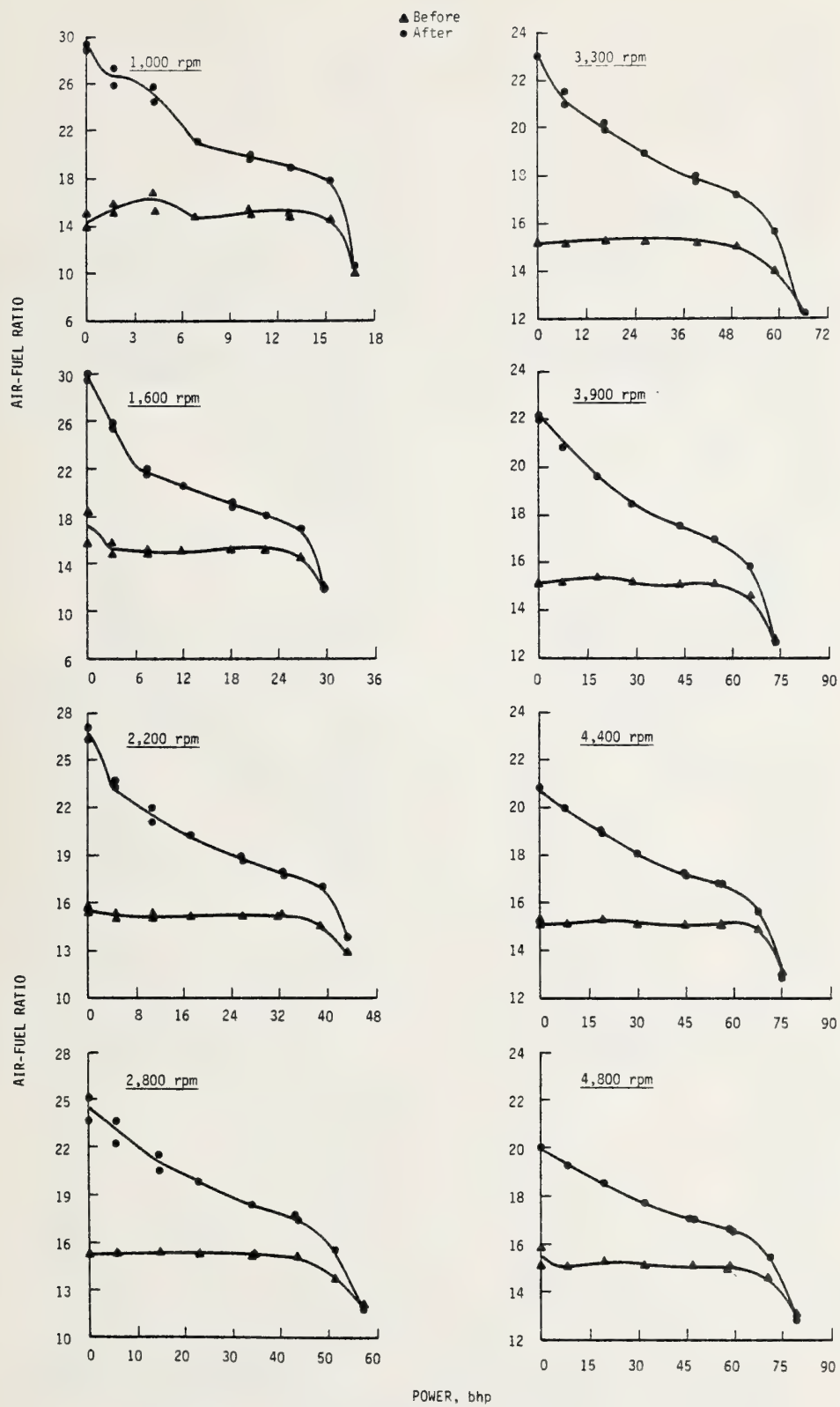


FIGURE 3. Air-Fuel Ratio Versus Power at Various Speed and Load Conditions--Ford 140-CID Engine.

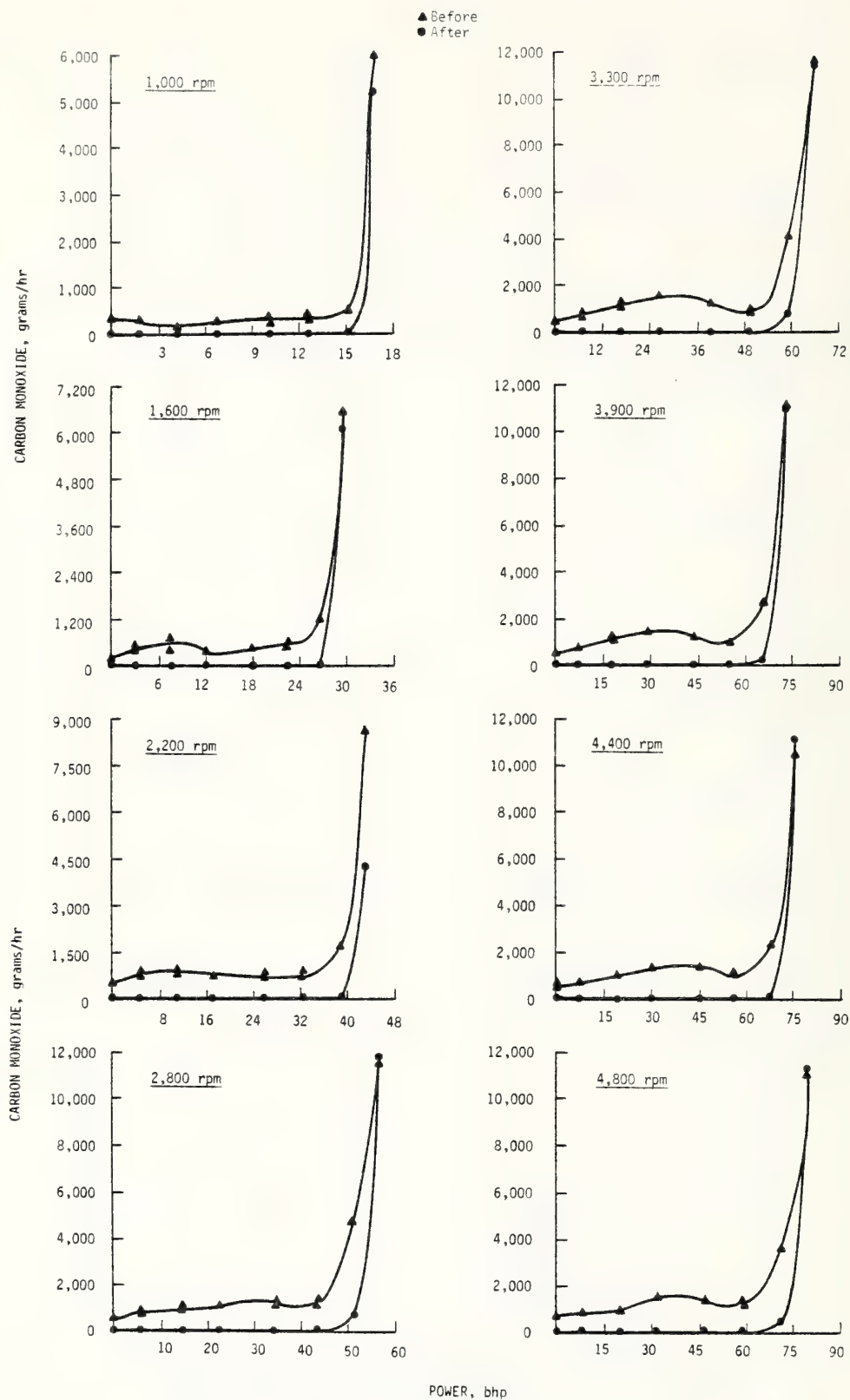


FIGURE 4. Carbon Monoxide Emissions Versus Power at Various Speed and Load Conditions--Ford 140-CID Engine.

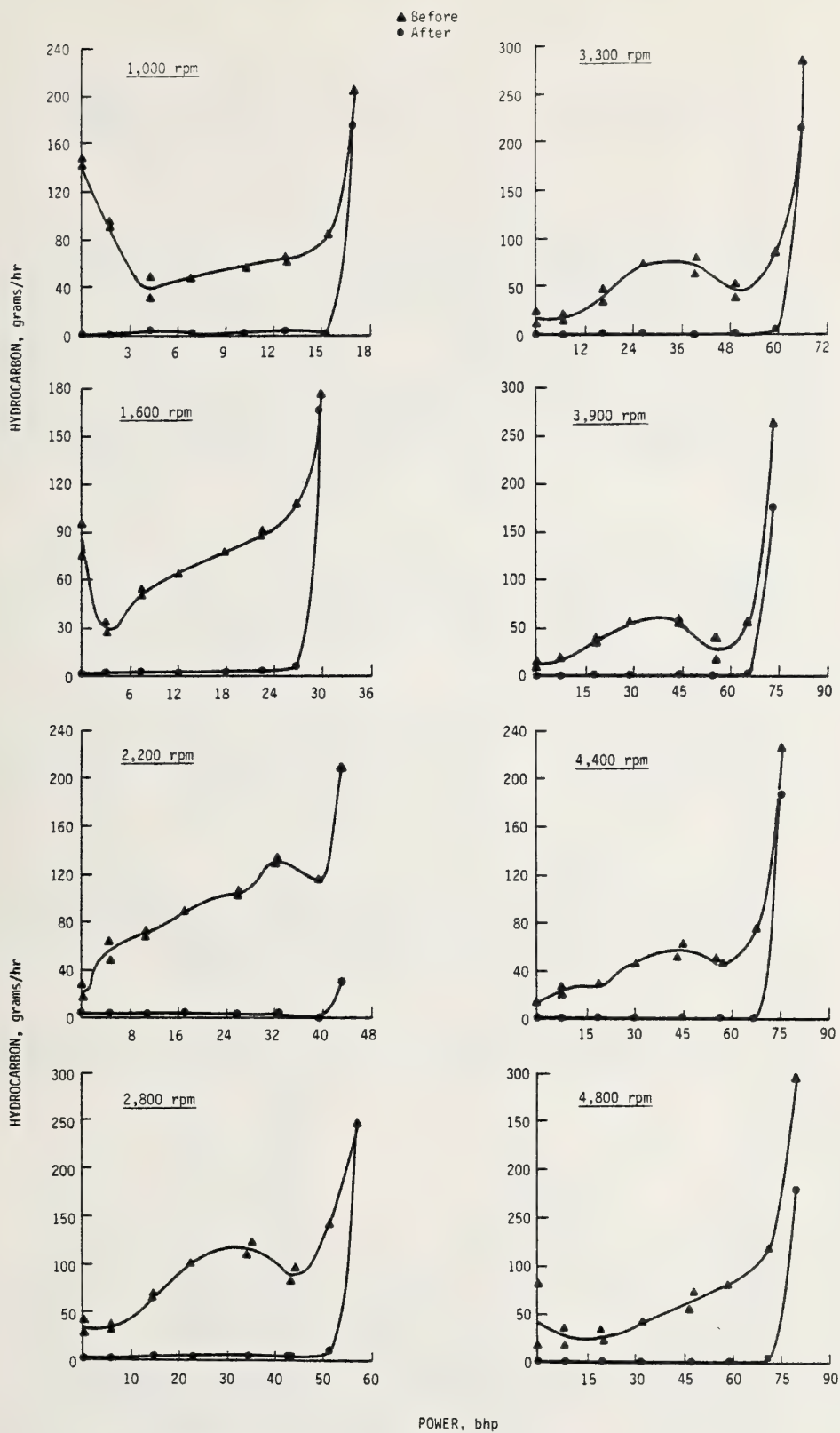


FIGURE 5. Hydrocarbon Emissions Versus Power
At Various Speed and Load Con-
ditions--Ford 140-CID Engine.

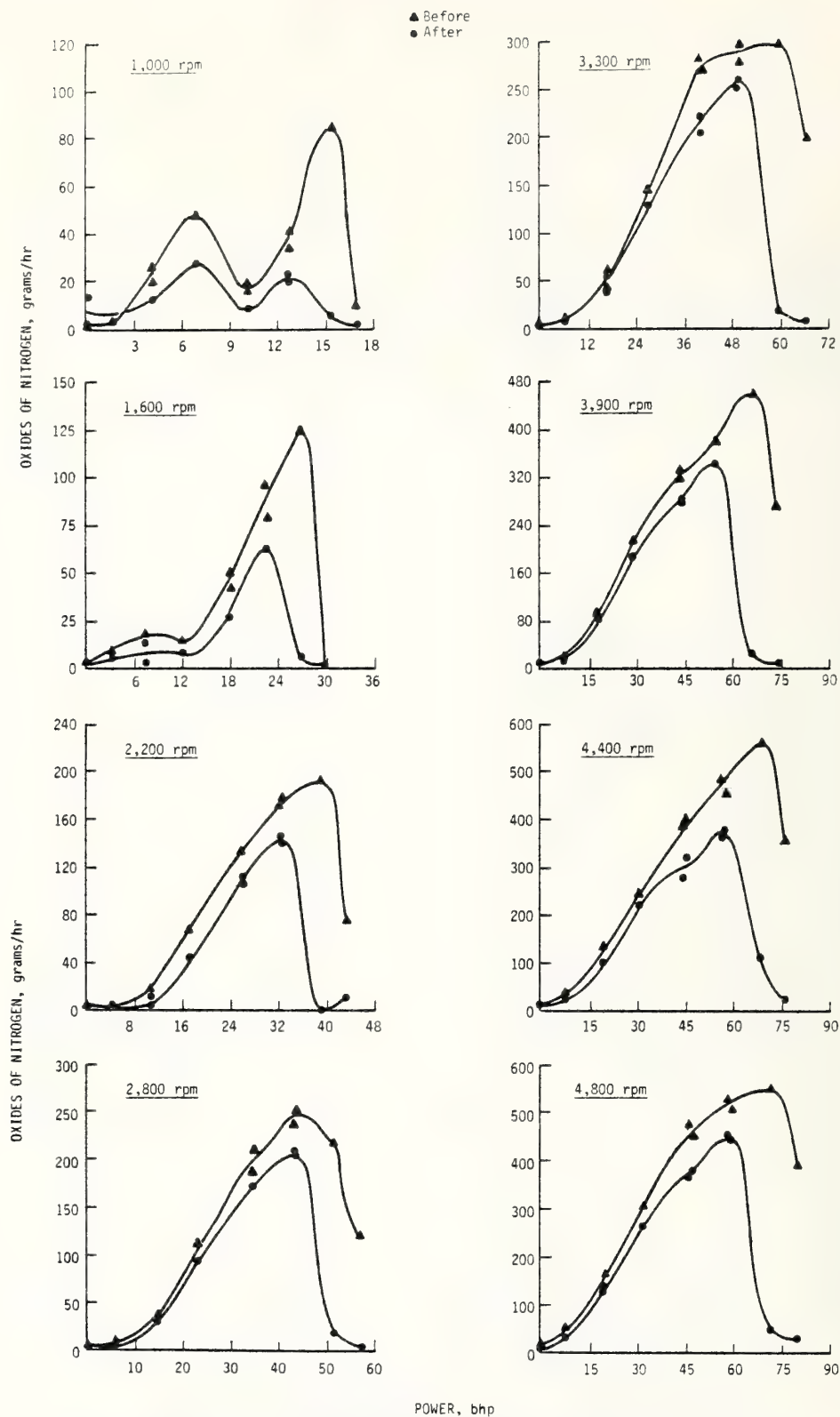


FIGURE 6. Oxides of Nitrogen Emissions Versus Power at Various Speed and Load Conditions--Ford 140-CID Engine.

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TOPOUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

1.01	1.02	2.01	2.02	3.01	3.02
1	2	1	2	1	2
11/ 7/78	11/ 7/78	11/ 7/78	11/ 7/78	11/ 7/78	11/ 7/78
751.5	751.5	750.5	750.5	750.0	750.0
49	49	49	49	49	49
76	76	76	76	76	76
850	850	850	850	850	850
0	0	10.0	10.0	15.0	15.0
0	0	1.6	1.6	2.4	2.4
2.0	2.0	2.4	2.3	2.7	2.6
37.0	37.0	37.0	37.0	37.0	37.0
20.0	20.0	19.0	19.0	18.0	18.0
126	127	117	117	114	113
4.0520	.0043	2.4787	.0020	2.7330	.0042
10.17	7.95	12.39	8.60	12.37	8.90
3.33	9.77	1.61	8.87	.91	8.24
11546	84	9196	142	5048	202
28	1	98	10	172	21
13.99	26.84	13.89	24.88	13.72	23.84
484.4	1.0	335.9	.5	419.1	1.1
69.3	1.0	62.6	1.7	38.9	2.7
.5	.0	1.9	.4	3.9	.8
183	182	182	185	188	187
48	50	50	50	47	47
177	178	182	179	180	179
2.0	1.0	2.0	1.0	2.0	1.0
414	600	480	540	506	524

ENGINE: 1979 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PPESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PPESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

4.01	4.02	5.01	5.02	6.01	6.02
1	2	1	2	1	2
12/27/78	12/27/78	11/ 8/78	12/ 8/78	11/13/78	11/13/78
753.0	753.0	743.0	743.0	743.0	743.0
33	33	48	48	72	72
76	76	80	80	81	81
750	750	1000	1000	1000	1000
6.0	6.0	90.0	90.0	81.0	81.0
8	8	17.0	17.0	15.4	15.4
2.1	2.1	12.0	11.4	7.5	7.4
38.0	38.0	16.0	16.0	17.0	17.0
19.8	19.8	1	1	2.8	2.8
127	128	84	84	88	88
3.8545	0106	10.5002	9.1069	1.1652	.0032
9.60	8.18	7.89	8.55	13.14	11.97
3.83	9.29	26	02	92	3.59
17578	143	7168	6258	3638	91
36	20	119	16	1121	57
13.81	25.89	10.22	10.61	14.57	17.74
470.1	2.4	5956.2	5123.1	536.6	1.8
107.7	1.6	204.2	176.8	84.1	2.6
6	6	9.8	1.3	83.9	5.2
184	184	210	210	202	202
43	43	47	47	48	48
183	184	182	182	183	182
3.0	1.0	15.0	5.0	12.0	5.0
411	359	958	829	896	746

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718	7.01	7.02	8.01	8.02	9.01	9.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/13/78	11/13/78	11/13/78	11/13/78	11/13/78	11/13/78
BAROMETER, MMHG	742.5	742.5	742.5	742.5	742.5	742.0
HUMIDITY, GRAINS/LB	72	71	71	71	74	74
TEMPERATURE, F	81	81	81	80	79	79
ENGINE SPEED, RPM	1000	1000	1000	1000	1000	1000
TORQUE, FT-LB	67.5	67.5	54.0	54.0	36.0	36.0
POWER, BHP*	12.8	12.8	10.3	10.3	6.8	6.9
FUEL RATE, LB/HR	6.1	6.1	5.4	5.3	4.2	4.2
IGNITION TIMING, DEG BTDC	21.0	21.0	27.0	27.0	37.0	37.0
MANIFOLD VACUUM, IN HG	4.7	4.5	6.6	6.7	13.2	13.2
INTAKE MAN. TEMP., F	109	111	132	133	98	99
CONCENTRATIONS, DRY BASIS						
CO, %	7937	.0054	7314	.0048	.9762	.0038
CO2, %	13.32	11.26	13.33	10.67	13.16	9.80
O2, %	1.10	4.65	1.14	5.38	1.19	6.54
HC, PPMC	3277	94	3380	92	3567	110
NOX, PPM	644	252	301	120	1098	431
AIR/FUEL RATIO	14.88	18.86	14.92	19.74	14.84	21.35
EMISSION RATES, G/HR						
CO	304.8	2.7	245.8	2.2	256.0	1.5
HC	63.2	2.3	57.0	2.1	47.0	2.1
NOX+	40.2	20.0	16.3	8.7	47.1	27.0
OIL TEMPERATURE, F	200	200	200	199	192	195
OIL PRESSURE, PSI	49	49	49	50	51	51
COOLANT TEMPERATURE, F	183	184	184	184	183	185
EXHAUST PRESSURE, IN. H2O	11.0	4.0	8.0	3.0	5.0	2.0
EXHAUST TEMPERATURE, F	859	636	807	566	665	490

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

	10.01	10.02	11.01	11.02	12.01	12.02
FUEL CODE: 7718						
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/13/78	11/13/78	11/13/78	11/13/78	11/13/78	11/13/78
BAROMETER, MMHG	741.5	741.5	742.0	741.5	742.0	741.5
HUMIDITY, GRAINS/LB	74	74	74	74	74	74
TEMPERATURE, F	78	78	79	78	78	77
ENGINE SPEED, RPM	1000	1000	1000	1000	1000	1000
TORQUE, FT-LB	22.5	22.5	9.0	9.0	9.0	9.0
POWER, BHP*	4.3	4.3	1.7	1.7	1.7	1.7
FUEL RATE, LB/HR	3.1	3.1	2.5	2.5	2.2	2.2
IGNITION TIMING, DEG BTDC	37.0	37.0	37.0	37.0	37.0	37.0
MANIFOLD VACUUM, IN HG	16.5	16.4	18.5	18.2	20.2	20.2
INTAKE MAN. TEMP., F	107	107	113	113	118	119
CONCENTRATIONS, DRY BASIS						
CO, %	4321	4059	13647	4047	25003	4044
CO2, %	13.09	8.46	11.14	8.01	10.55	7.20
O2, %	1.61	8.60	3.34	9.16	3.55	10.26
HC, PPMC	4722	305	11489	120	21344	91
NOX, PPM	587	237	139	60	59	20
AIR/FUEL RATIO	15.26	24.70	15.30	25.98	13.91	28.75
EMISSION RATES, G/HR						
CO	87.6	1.9	222.7	1.3	333.5	1.2
HC	48.0	5.0	94.1	1.7	143.0	1.3
NOX+	19.5	12.7	3.7	2.8	1.3	.9
OIL TEMPERATURE, F	195	195	193	193	190	189
OIL PRESSURE, PSI	51	51	51	51	52	53
COOLANT TEMPERATURE, F	185	185	185	184	181	181
EXHAUST PRESSURE, IN. H2O	4.0	2.0	4.0	2.0	4.0	1.0
EXHAUST TEMPERATURE, F	595	389	500	491	433	467

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

13.01	13.02	14.01	14.02	15.01	15.02
1	2	1	2	1	2
11/14/78	11/14/78	11/14/78	11/14/78	11/14/78	11/14/78
751.0	751.0	751.5	751.5	751.5	751.5
44	44	44	44	44	44
82	82	80	82	80	81
1600	1600	1600	1600	1600	1600
100.0	100.0	90.0	90.0	75.0	75.0
29.9	29.9	26.9	26.9	22.4	22.4
17.4	17.3	13.5	13.4	10.8	10.9
14.0	14.0	13.0	13.0	20.0	20.0
.2	.2	3.0	3.0	5.4	5.4
73	73	82	82	102	103
7.3660	6.8340	1.4895	.0008	.7175	.0000
10.26	10.36	13.31	12.86	13.63	11.96
.16	.00	.79	2.79	1.06	4.04
4001	3705	2650	141	2559	65
5	15	1070	48	990	540
11.62	11.71	14.44	16.92	14.97	18.14
6434.0	6085.7	1201.3	.8	481.4	.0
175.5	165.7	107.4	6.7	86.2	2.7
.7	2.0	123.8	6.6	95.3	63.8
216	216	211	213	210	211
54	54	55	55	55	55
186	186	186	185	186	186
27.0	9.0	30.0	12.0	20.0	8.0
1155	751	1202	890	1090	714

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

	16.01	16.02	17.01	17.02	18.01	18.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/14/78	11/14/78	11/14/78	11/14/78	11/14/78	11/14/78
BAROMETER, MMHG	751.5	751.5	751.5	751.5	751.0	751.0
HUMIDITY, GRAINS/LB	44	44	44	44	44	44
TEMPERATURE, F	79	79	79	79	78	78
ENGINE SPEED, RPM	1600	1600	1600	1600	1600	1600
TORQUE, FT-LB	60.0	60.0	40.0	40.0	25.0	25.0
POWER, BHP*	17.9	17.9	12.0	12.0	7.5	7.5
FUEL RATE, LB/HR	9.2	9.4	7.2	7.2	5.6	5.7
IGNITION TIMING, DEG BTDC	27.0	27.0	34.0	34.0	36.0	36.0
MANIFOLD VACUUM, IN HG	8.0	8.0	11.7	11.2	16.2	16.2
INTAKE MAN. TEMP., F	121	123	150	151	124	124
CONCENTRATIONS, DRY BASIS						
CO, %	7643	.0025	.8856	.0000	1.2388	.0000
CO2, %	13.47	11.37	13.28	10.39	12.97	9.58
O2, %	1.13	4.91	1.26	6.08	1.33	7.14
HC, PPMC	2632	55	2821	65	2816	57
NOX, PPM	607	256	225	88	240	45
AIR/FUEL RATIO	14.98	19.04	14.98	20.55	14.86	22.11
EMISSION RATES, G/HR						
CO	439.9	1.8	395.9	.0	434.2	.0
HC	76.1	2.1	63.3	2.0	49.6	1.5
NOX+	50.2	27.3	14.4	7.9	12.1	3.5
OIL TEMPERATURE, F	206	209	208	207	205	205
OIL PRESSURE, PSI	55	55	55	55	56	56
COOLANT TEMPERATURE, F	186	187	187	187	186	187
EXHAUST PRESSURE, IN. H2O	15.0	6.0	12.0	4.0	9.0	3.0
EXHAUST TEMPERATURE, F	1040	664	945	571	858	509

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

	19.01	19.02	20.01	20.02	21.01	21.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/14/78	11/14/78	11/14/78	11/14/78	11/27/78	11/27/78
BAROMETER, MMHG	751.5	751.5	751.0	751.0	746.5	746.5
HUMIDITY, GRAINS/LB	41	41	43	43	36	36
TEMPERATURE, F	77	77	77	76	83	82
ENGINE SPEED, RPM	1600	1600	1600	1600	2200	2200
TORQUE, FT-LB	10.0	10.0	.0	.0	105.0	105.0
POWER, BHP*	3.0	3.0	.0	.0	43.4	43.4
FUEL RATE, LB/HR	4.1	4.1	3.5	3.3	24.5	24.5
IGNITION TIMING, DEG BTDC	36.0	36.0	36.0	36.0	18.0	18.0
MANIFOLD VACUUM, IN HG	20.6	20.6	22.0	21.3	.5	.5
INTAKE MAN. TEMP., F	106	103	104	103	76	76
CONCENTRATIONS, DRY BASIS						
CO, %	1.6517	.0010	.4671	.0003	6.6754	3.0771
CO2, %	12.47	8.06	12.22	7.03	10.30	12.88
O2, %	1.57	9.20	2.74	10.62	.71	.42
HC, PPMC	2591	91	7895	72	3241	414
NOX, PPM	257	81	125	55	428	55
AIR/FUEL RATIO	14.85	25.98	15.71	29.60	12.18	13.72
EMISSION RATES, G/HR						
CO	420.3	.5	111.0	.1	8556.4	4257.0
HC	33.1	2.1	94.2	1.5	208.7	28.8
NOX+	9.3	5.2	4.3	3.3	76.2	10.6
OIL TEMPERATURE, F	203	202	201	200	229	224
OIL PRESSURE, PSI	56	56	57	56	56	56
COOLANT TEMPERATURE, F	185	186	185	184	187	185
EXHAUST PRESSURE, IN. H2O	6.0	2.0	5.0	2.0	55.0	55.0
EXHAUST TEMPERATURE, F	760	401	721	343	1260	1360

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

22.01	22.02	23.01	23.02	24.01	24.02
1	2	1	2	1	2
12/27/78	11/27/78	11/28/78	11/28/78	11/28/78	11/28/78
746.5	747.0	750.5	750.0	750.0	750.5
44	44	39	39	39	39
84	83	79	80	80	80
2200	2200	2200	2200	2200	2200
95.0	95.0	79.0	79.0	63.0	63.0
39.3	39.3	32.4	32.4	25.9	25.8
18.8	18.7	15.4	15.4	12.8	12.8
19.0	19.0	25.0	25.0	32.0	32.0
2.7	2.7	5.6	5.6	8.7	8.7
82	83	97	99	112	113
1.4666	.0089	.7599	.0089	.8471	.0089
13.63	13.16	13.33	11.88	13.25	11.36
.79	2.91	1.19	3.91	1.17	4.67
2023	0	2620	43	2475	56
1206	5	1258	899	1177	784
14.52	16.97	15.05	18.07	15.00	18.86
1624.2	11.4	738.5	10.4	683.0	9.1
112.5	.0	127.9	2.5	100.2	2.9
192.1	.9	171.9	147.5	133.5	112.1
227	228	219	220	220	220
56	56	57	57	57	57
186	187	186	187	185	186
54.0	54.0	39.0	16.0	31.0	12.0
1328	1110	1229	996	1137	863

ENGINE 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

25.01	25.02	26.01	26.02	27.01	27.02
1	2	1	2	1	2
11/28/78	11/28/78	11/28/78	11/28/78	11/28/78	11/28/78
750.5	750.5	750.5	750.0	750.5	750.5
39	39	39	39	39	39
79	79	77	77	78	78
2200	2200	2200	2200	2200	2200
42.0	42.0	26.0	26.0	11.0	11.0
17.2	17.2	10.7	10.7	4.5	4.5
9.9	10.0	7.9	8.0	6.4	6.4
38.0	38.0	39.0	39.0	39.0	39.0
12.5	12.5	15.4	15.4	17.8	17.8
132	133	154	53	164	162
1.0748	.0076	1.5149	.0075	1.7686	.0082
12.97	10.54	12.62	9.75	12.38	8.95
1.46	5.86	1.61	7.02	1.78	8.17
2801	58	2719	52	3074	54
745	357	223	56	75	23
15.05	20.27	14.93	21.85	14.89	23.73
672.3	6.5	754.1	5.6	709.1	5.2
88.0	2.5	68.0	1.9	61.9	1.7
65.6	42.8	15.6	5.8	4.2	2.1
217	217	215	214	210	210
57	57	58	58	58	58
188	188	189	188	187	186
21.0	8.0	16.0	6.0	12.0	4.0
1022	637	967	616	936	540

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

28.01	28.02	29.01	29.02	30.01	30.02
11/28/78	11/28/78	11/28/78	11/ 8/78	11/28/78	11/28/78
750.5	750.0	749.5	749.5	749.5	749.0
39	39	41	41	41	41
77	77	83	85	86	88
2200	2200	2800	2800	2800	2800
.0	.0	110.0	110.0	99.0	99.0
.0	.0	57.5	57.5	51.7	51.8
4.8	4.8	32.9	32.9	26.7	26.6
39.0	39.0	18.0	18.0	19.0	19.0
22.1	22.1	.8	.8	2.2	2.2
105	102	73	75	78	80
1.4208	.0088	6.6220	6.7258	3.0103	.3956
12.62	7.84	10.19	10.13	12.22	13.44
1.91	9.82	.61	.09	.64	1.26
1922	80	2832	2841	1803	95
167	65	489	19	975	73
15.27	27.05	12.16	11.81	13.75	15.51
431.7	4.8	11510.5	11650.0	4715.8	686.8
29.3	2.2	247.2	247.1	141.8	8.3
7.2	5.0	120.4	4.7	216.4	18.0
209	209	227	239	237	240
59	59	59	59	58	58
185	186	188	187	187	186
10.0	4.0	76.0	32.0	91.0	40.0
864	422	1325	1026	1403	1299

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

31.01	31.02	32.01	32.02	33.01	33.02
1	2	1	2	1	2
11/28/78	11/28/78	11/28/78	11/28/78	11/28/78	11/28/78
749.0	749.0	748.5	748.5	747.0	746.5
41	41	41	41	41	41
87	87	86	86	82	82
2800	2800	2800	2800	2800	2800
83.0	83.0	66.0	66.0	44.0	44.0
43.4	43.4	34.5	34.5	23.1	23.1
21.2	21.2	17.4	17.4	13.3	13.4
24.0	24.0	32.0	32.0	38.0	38.0
4.4	4.4	7.7	7.7	12.0	12.0
97	98	116	116	122	122
7611	7611	9680	9680	1.1158	1.1158
13.35	12.12	12.93	11.66	12.67	10.64
87	3.38	1.29	4.16	1.59	5.49
1219	25	1966	38	2326	52
1251	934	1179	900	906	582
14.97	17.58	15.09	18.34	15.18	19.89
1023.8	14.8	1079.7	12.3	959.8	9.6
82.3	2.0	110.1	2.6	100.5	3.0
238.4	208.6	186.4	171.8	110.5	93.7
239	239	238	237	231	231
58	58	58	58	59	59
188	187	187	187	189	188
67.0	28.0	46.0	20.0	30.0	13.0
1416	1041	1255	950	1157	872

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718	34.01	34.02	35.01	35.02	36.01	36.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/28/78	11/28/78	11/28/78	11/28/78	11/28/78	11/28/78
BAROMETER, MMHG	746.5	746.5	746.5	746.5	746.0	746.5
HUMIDITY, GRAINS/LB	41	41	41	41	41	41
TEMPERATURE, F	82	81	81	81	81	81
ENGINE SPEED, RPM	2800	2800	2800	2800	2800	2800
TORQUE, FT-LB	28.0	28.0	11.0	11.0	.0	.0
POWER, BHP*	14.7	14.7	5.8	5.8	.0	.0
FUEL RATE, LB/HR	10.6	10.6	8.2	8.2	7.1	7.1
IGNITION TIMING, DEG BTDC	40.0	40.0	40.0	40.0	40.0	40.0
MANIFOLD VACUUM, IN HG	15.0	15.0	17.7	17.7	19.0	19.0
INTAKE MAN. TEMP., F	140	139	162	162	175	175
CONCENTRATIONS, DRY BASIS						
CO, %	1.3185	.0081	1.4154	.0078	1.1056	.0076
CO2, %	12.37	9.76	12.55	8.97	12.66	8.46
O2, %	1.71	6.75	1.57	8.03	1.51	8.92
HC, PPMC	1877	60	1190	49	1782	44
NOX, PPM	388	210	95	47	58	31
AIR/FUEL RATIO	15.20	21.58	15.11	23.57	15.16	25.14
EMISSION RATES, G/HR						
CO	908.8	8.0	742.2	6.5	509.4	5.7
HC	65.0	3.0	31.3	2.0	41.2	1.6
NOX+	38.0	29.1	7.1	5.5	3.8	3.3
OIL TEMPERATURE, F	228	227	224	223	222	221
OIL PRESSURE, PSI	60	60	60	60	61	61
COOLANT TEMPERATURE, F	188	187	187	187	188	188
EXHAUST PRESSURE, IN. H2O	22.0	9.0	17.0	6.0	14.0	5.0
EXHAUST TEMPERATURE, F	1103	817	1112	737	1166	686

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

37.01	37.02	38.01	38.02	39.01	39.02
1	2	1	2	1	2
11/28/78	11/28/78	11/28/78	11/28/78	11/28/78	11/28/78
745.0	745.0	744.5	744.5	744.5	744.5
41	41	41	41	41	41
88	90	94	94	93	93
3300	3300	3300	3300	3300	3300
107.0	107.0	96.0	96.0	80.0	80.0
66.3	66.3	59.5	59.5	49.6	49.6
36.2	36.3	30.4	30.2	24.6	24.5
19.0	19.0	19.0	19.0	25.0	25.0
1.0	1.0	2.1	2.1	4.5	4.5
78	80	86	87	103	103
5.8471	5.7647	2.1825	.3439	.4782	.0083
10.58	10.83	12.74	13.24	13.61	12.22
.24	.09	.39	1.33	.58	2.98
2878	2205	940	66	493	14
721	23	1153	60	1264	989
12.24	12.25	14.03	15.60	14.98	17.24
11431.7	11238.4	3985.4	690.8	751.8	15.1
282.6	215.9	86.2	6.6	39.0	1.3
199.9	6.5	298.9	17.1	281.9	254.5
249	255	252	252	250	250
58	58	58	58	59	59
189	189	187	187	189	188
98.0	43.0	114.0	52.0	86.0	38.0
1415	1193	1545	1400	1526	1195

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	40.01	40.02	41.01	41.02	42.01	42.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	11/29/78	11/29/78	11/29/78	11/29/78	11/29/78	11/29/78
BAROMETER, MMHG	743.5	743.5	742.5	742.5	743.0	742.5
HUMIDITY, GRAINS/LB	44	44	48	40	40	40
TEMPERATURE, F	87	88	84	84	85	85
ENGINE SPEED, RPM	3300	3300	3300	3300	3300	3300
TORQUE, FT-LB	64.0	64.0	43.0	43.0	27.0	27.0
POWER, BHP*	39.8	39.8	26.8	26.8	16.8	16.8
FUEL RATE, LB/HR	20.5	20.7	16.6	16.6	12.9	12.9
IGNITION TIMING, DEG BTDC	34.0	34.0	41.0	41.0	43.0	43.0
MANIFOLD VACUUM, IN HG	7.7	7.7	11.7	11.7	15.1	15.1
INTAKE MAN. TEMP., F	116	116	117	120	135	136
CONCENTRATIONS, DRY BASIS						
CO, %	9106	0093	1.4195	0088	1.2261	0086
CO2, %	13.58	12.02	12.64	11.32	12.74	10.44
O2, %	1.12	3.85	1.71	4.69	1.61	5.79
HC, PPMC	994	19	1379	30	831	26
NOX, PPM	1312	921	927	690	372	248
AIR/FUEL RATIO	15.10	17.98	15.21	18.89	15.28	20.25
EMISSION RATES, G/HR						
CO	1153.2	14.4	1500.3	11.6	1020.5	9.7
HC	63.2	1.5	73.2	2.0	34.8	1.4
NOX+	238.3	204.8	143.1	128.9	43.6	39.2
OIL TEMPERATURE, F	245	245	234	239	237	237
OIL PRESSURE, PSI	59	59	61	61	61	61
COOLANT TEMPERATURE, F	188	188	189	190	189	189
EXHAUST PRESSURE, IN. H2O	63.0	28.0	44.0	19.0	28.0	13.0
EXHAUST TEMPERATURE, F	1373	1000	1270	928	1266	870

* CORRECTED SAE J8168

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

43.01	43.02	44.01	44.02	45.01	45.02
1	2	1	2	1	2
11/29/78	11/29/78	11/29/78	11/29/78	11/29/78	11/29/78
742.5	743.0	743.0	743.0	743.5	743.0
46	46	46	46	42	42
84	84	84	84	91	92
3300	3300	3300	3300	3900	3900
11.0	11.0	.0	.0	100.0	100.0
6.9	6.9	.0	.0	73.5	73.6
10.0	10.1	8.8	8.8	41.2	40.9
43.0	43.0	44.0	44.0	22.0	22.0
18.0	18.0	19.2	19.2	1.2	1.2
158	158	170	170	79	79
9318	.0075	.7563	.0079	4.9205	4.9424
13.13	9.72	13.46	9.17	11.43	11.53
1.18	6.91	1.11	7.68	.22	.08
469	11	329	15	2330	1592
97	43	64	32	835	26
15.15	21.77	15.19	23.02	12.68	12.64
595.4	7.0	422.2	6.8	11044.3	10982.9
15.1	.5	9.2	.6	262.7	177.6
9.0	5.8	5.2	4.0	267.1	8.4
232	232	230	230	251	253
62	62	62	62	60	60
189	187	188	187	189	189
20.0	8.0	15.0	7.0	128.0	59.0
1337	803	1353	760	1463	1200

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

46.01	46.02	47.01	47.02	48.01	48.02
1	2	1	2	1	2
11/29/78	11/29/78	11/29/78	11/29/78	11/29/78	11/29/78
743.5	743.5	743.5	743.5	743.5	743.5
42	42	42	42	42	42
90	94	96	97	95	95
3900	3900	3900	3900	3900	3900
90.0	90.0	75.0	75.0	60.0	60.0
66.2	66.2	55.1	55.1	44.1	44.1
34.6	34.6	28.2	28.1	24.1	24.1
22.0	22.0	27.0	27.0	36.0	36.0
2.1	2.1	4.8	4.8	7.7	7.7
82	86	109	109	122	121
1.2610	.0876	.4753	.0084	.8114	.0089
13.56	13.62	13.96	12.82	13.49	12.26
.48	1.41	.59	2.69	.93	3.27
529	26	441	11	732	14
1539	63	1523	1225	1474	1129
14.56	15.78	15.00	16.91	15.05	17.47
2647.5	199.8	836.6	16.6	1229.0	15.7
55.8	2.9	39.0	1.1	55.7	1.3
460.3	20.5	381.9	345.7	318.1	285.2
250	260	261	261	258	258
60	60	59	59	60	60
189	189	189	189	189	189
142.0	66.0	104.0	48.0	80.0	36.0
1595	1331	1544	1180	1427	1108

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718	49.01	49.02	50.01	50.02	51.01	51.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78
BAROMETER, MMHG	746.5	746.5	746.5	746.5	746.5	746.5
HUMIDITY, GRAINS/LB	45	45	45	45	45	45
TEMPERATURE, F	80	80	80	80	81	81
ENGINE SPEED, RPM	3900	3900	3900	3900	3900	3900
TORQUE, FT-LB	40.0	40.0	25.0	25.0	10.0	10.0
POWER, BHP*	29.3	29.3	18.3	18.3	7.3	7.3
FUEL RATE, LB/HR	19.6	19.6	16.0	15.9	12.6	12.5
IGNITION TIMING, DEG BTDC	42.0	42.0	44.0	44.0	45.0	45.0
MANIFOLD VACUUM, IN HG	11.7	11.7	14.7	14.7	17.5	17.5
INTAKE MAN. TEMP., F	114	115	125	125	143	143
CONCENTRATIONS, DRY BASIS						
CO, %	1.1236	.0074	1.1495	.0072	.9050	.0078
CO2, %	13.25	11.82	13.18	11.06	13.59	10.37
O2, %	1.26	4.34	1.48	5.34	1.09	6.36
HC, PPMC	926	30	764	27	486	16
NOX, PPM	1192	857	628	418	147	72
AIR/FUEL RATIO	15.10	18.44	15.23	19.55	15.09	20.82
EMISSION RATES, G/HR						
CO	1375.6	11.1	1151.8	9.3	705.6	8.5
HC	56.9	2.2	38.4	1.7	19.0	.9
NOX+	210.6	185.2	90.8	78.0	16.5	11.4
OIL TEMPERATURE, F	248	250	246	245	242	241
OIL PRESSURE, PSI	61	61	61	61	62	62
COOLANT TEMPERATURE, F	189	190	189	189	190	189
EXHAUST PRESSURE, IN. H2O	55.0	25.0	41.0	18.0	27.0	12.0
EXHAUST TEMPERATURE, F	1314	1055	1295	915	1364	785

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

52.01	52.02	53.01	53.02	54.01	54.02
1	2	1	2	1	2
11/30/78	11/30/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78
746.5	746.0	731.5	731.0	731.0	731.5
45	45	36	37	37	36
81	81	87	89	91	91
3900	3900	4400	4400	4400	4400
0	0	90.0	90.0	81.0	81.0
0	0	75.7	75.8	68.2	68.2
10.8	10.9	43.8	43.8	36.6	36.7
46.0	46.0	26.0	26.0	26.0	26.0
19.0	19.0	1.3	1.3	2.0	2.0
157	157	77	79	85	85
7207	0061	4.3068	4.7250	.9659	.0221
13.74	9.76	11.85	11.92	13.71	14.19
1.00	7.18	.52	.12	.80	1.16
513	14	1856	1587	665	14
86	41	1063	66	1803	342
15.11	22.02	13.16	12.79	14.90	15.61
484.8	6.1	10424.4	11122.1	2167.6	51.6
17.3	.7	225.6	187.6	75.0	1.6
8.3	5.9	358.5	21.8	563.8	111.0
239	238	259	272	267	267
63	63	59	59	58	58
188	188	188	189	188	188
22.0	10.0	147.0	68.0	156.0	72.0
1376	753	1481	1271	1592	1396

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

55.01	55.02	56.01	56.02	57.01	57.02
1	2	1	2	1	2
12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78
731.5	731.5	731.5	731.5	731.5	731.5
36	36	36	36	36	36
91	91	93	93	89	89
4400	4400	4400	4400	4400	4400
68.0	68.0	54.0	54.0	36.0	36.0
57.2	57.2	45.4	45.4	30.3	30.3
31.4	31.4	26.9	26.9	21.7	21.8
30.0	30.0	38.0	38.0	44.0	44.0
4.6	4.6	7.3	7.3	11.1	11.1
104	104	122	122	124	124
4848	.0096	.7468	.0109	.9410	.0098
14.24	13.02	13.65	12.65	13.46	11.94
.69	2.54	.86	2.94	1.06	3.89
461	12	726	15	665	16
1712	1260	1705	1195	1309	958
15.06	16.76	15.04	17.13	15.08	18.04
931.8	20.8	1255.4	21.0	1276.4	16.2
44.4	1.3	61.3	1.5	45.3	1.3
458.5	382.5	399.4	319.8	247.5	219.6
261	261	270	270	259	259
59	59	58	58	60	60
190	190	190	190	190	190
124.0	57.0	97.0	44.0	69.0	31.0
1547	1222	1474	1170	1421	11080

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	58.01	58.02	59.01	59.02	60.01	60.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78
BAROMETER, MMHG	731.5	731.0	731.0	731.5	731.5	731.5
HUMIDITY, GRAINS/LB	36	37	37	36	36	36
TEMPERATURE, F	90	90	90	90	90	90
ENGINE SPEED, RPM	4400	4400	4400	4400	4400	4400
TORQUE, FT-LB	23.0	23.0	9.0	9.0	0	0
POWER, BHP*	19.4	19.4	7.6	7.6	0	0
FUEL RATE, LB/HR	18.0	18.4	14.8	14.8	12.8	12.8
IGNITION TIMING, DEG BTDC	48.0	48.0	49.0	49.0	48.0	48.0
MANIFOLD VACUUM, IN HG	13.9	13.9	16.8	16.8	18.2	18.2
INTAKE MAN. TEMP., F	134	134	147	147	159	159
CONCENTRATIONS, DRY BASIS						
CO, %	.7776	.0110	.7494	.0100	.5293	.0108
CO2, %	13.39	11.31	13.43	10.58	13.30	10.04
O2, %	1.16	4.66	.85	5.50	.92	6.19
HC, PPMC	495	12	432	7	338	7
NOX, PPM	819	602	241	144	115	60
AIR/FUEL RATIO	15.23	18.87	15.01	19.91	15.18	20.85
EMISSION RATES, G/HR						
CO	888.6	16.1	704.1	12.6	442.9	12.5
HC	28.4	.9	20.4	.4	14.2	.4
NOX+	130.4	123.0	31.5	25.4	13.5	9.6
OIL TEMPERATURE, F	260	260	255	255	253	253
OIL PRESSURE, PSI	60	60	61	61	61	61
COOLANT TEMPERATURE, F	191	191	189	189	188	188
EXHAUST PRESSURE, IN. H2O	52.0	23.0	38.0	16.0	31.0	13.0
EXHAUST TEMPERATURE, F	1414	1030	1459	970	1451	912

* CORRECTED SAE J8168
+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	61.01	61.02	62.01	62.02	63.01	63.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78
BAROMETER, MMHG	731.0	731.5	731.5	731.5	731.5	731.5
HUMIDITY, GRAINS/LB	37	36	36	36	36	36
TEMPERATURE, F	91	94	95	95	96	96
ENGINE SPEED, RPM	4800	4800	4800	4800	4800	4800
TORQUE, FT-LB	87.0	87.0	78.0	78.0	65.0	65.0
POWER, BHP*	79.9	79.9	71.6	71.6	59.7	59.7
FUEL RATE, LB/HR	46.5	46.4	39.6	39.6	34.0	34.0
IGNITION TIMING, DEG BTDC	27.0	27.0	28.0	28.0	30.0	30.0
MANIFOLD VACUUM, IN HG	1.5	1.5	2.0	2.0	4.3	4.3
INTAKE MAN. TEMP., F	80	81	85	85	111	111
CONCENTRATIONS, DRY BASIS						
CO, %	4.2113	4.3932	1.4612	1.594	.5109	.0104
CO2, %	11.69	11.78	13.02	13.69	13.48	12.74
O2, %	.39	.11	.68	.91	.68	2.24
HC, PPMC	2252	1402	925	35	260	9
NOX, PPM	1092	71	1626	130	1681	1337
AIR/FUEL RATIO	13.07	12.89	14.56	15.38	15.08	16.58
EMISSION RATES, G/HR						
CO	10974.3	11284.0	3586.3	411.0	1118.3	25.1
HC	294.7	180.8	114.0	4.6	28.5	1.1
NOX+	396.7	25.5	556.1	46.7	512.7	448.8
OIL TEMPERATURE, F	266	271	275	275	279	279
OIL PRESSURE, PSI	57	57	54	54	53	53
COOLANT TEMPERATURE, F	190	189	190	190	190	190
EXHAUST PRESSURE, IN. H2O	165.0	77.0	174.0	82.0	143.0	67.0
EXHAUST TEMPERATURE, F	1523	1280	1602	1430	1600	1280

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J8168

+ CORRECTED FOR HUMIDITY

64.01	64.02	65.01	65.02	66.01	66.02
1	2	1	2	1	2
12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78
731.5	731.5	732.5	732.5	732.5	732.5
39	39	38	36	36	36
94	94	88	88	91	91
4800	4800	4800	4800	4800	4800
52.0	52.0	35.0	35.0	22.0	22.0
47.8	47.8	32.1	32.1	20.2	20.2
29.4	29.4	24.2	24.2	19.8	19.7
40.0	40.0	46.0	46.0	49.0	49.0
7.1	7.1	10.8	10.8	13.9	13.9
21	121	121	121	136	136
.7012	.0091	.9093	.0104	.6944	.0091
13.32	12.34	13.15	11.91	13.36	11.43
.83	2.66	1.02	3.46	1.05	4.27
723	12	527	10	338	7
1726	1273	1420	1040	929	657
15.04	16.97	15.09	17.70	15.21	18.49
1320.3	19.6	1407.5	19.1	881.4	14.1
68.3	1.3	40.9	.9	21.6	.6
457.4	385.1	308.3	265.9	164.3	142.7
275	275	255	255	268	268
54	54	57	57	55	55
191	191	191	191	191	191
111.0	51.0	82.0	37.0	60.0	26.0
501	1203	1450	1109	1462	1063

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

67.01	67.02	68.01	68.02	69.01	69.02
1	2	1	2	1	2
12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	11/30/78	11/30/78
732.5	732.5	732.5	733.0	745.5	745.5
36	36	36	36	43	43
91	91	91	91	76	76
4800	4800	4800	4800	850	850
9.0	9.0	.0	.0	.0	.0
8.2	8.2	.0	.0	.0	.0
16.3	16.3	14.3	14.3	2.0	2.0
50.0	50.0	50.0	50.0	37.0	37.0
16.5	16.5	17.9	17.9	20.3	20.3
146	146	154	154	118	119
.6861	.0093	.6697	.0091	2.3812	.0068
13.56	10.93	13.40	10.43	8.46	7.08
.82	5.03	.88	5.56	6.43	10.52
339	5	311	5	22572	71
327	164	140	69	51	36
15.04	19.32	15.08	20.04	15.83	29.34
706.2	12.5	611.3	11.2	331.2	1.8
17.5	.4	14.3	.3	157.7	.9
46.8	30.7	17.8	11.8	1.0	1.3
265	265	261	261	171	172
58	58	57	57	53	53
190	190	190	190	176	177
46.0	20.0	39.0	16.0	1.0	1.0
1493	1024	1503	981	290	439

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	70.01	70.02	71.01	71.02	73.01	73.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78
BAROMETER, MMHG	745.0	745.5	745.5	745.0	743.0	743.5
HUMIDITY, GRAINS/LB	43	43	43	43	45	45
TEMPERATURE, F	76	76	76	76	80	80
ENGINE SPEED, RPM	850	850	850	850	1000	1000
TORQUE, FT-LB	10.0	10.0	15.0	15.0	67.5	67.5
POWER, BHP*	1.6	1.6	2.4	2.4	12.7	12.7
FUEL RATE, LB/HR	2.4	2.3	2.6	2.6	6.4	6.4
IGNITION TIMING, DEG BTDC	37.0	37.0	37.0	37.0	25.0	25.0
MANIFOLD VACUUM, IN HG	19.0	19.0	18.5	18.5	5.4	5.4
INTAKE MAN. TEMP., F	112	113	109	109	109	111
CONCENTRATIONS, DRY BASIS						
CO, %	2.2079	.0075	1.9739	.0081	1.0553	.0082
CO2, %	10.21	7.79	10.84	8.11	12.63	11.14
O2, %	4.58	9.32	3.62	8.86	1.75	4.84
HC, PPMC	10767	136	7836	156	3204	116
NOX, PPM	149	35	245	95	556	308
AIR/FUEL RATIO	15.85	26.49	15.60	25.47	15.22	19.07
EMISSION RATES, G/HR						
CO	348.0	2.0	338.2	2.4	438.1	4.2
HC	85.2	1.8	67.4	2.3	66.8	3.0
NOX+	3.4	1.3	6.0	4.0	33.3	22.9
OIL TEMPERATURE, F	178	179	181	182	190	192
OIL PRESSURE, PSI	51	51	49	49	52	52
COOLANT TEMPERATURE, F	182	184	185	185	186	186
EXHAUST PRESSURE, IN. H2O	1.0	1.0	1.0	1.0	9.0	41.0
EXHAUST TEMPERATURE, F	374	430	400	392	745	605

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	74.01	74.02	75.01	75.02	76.01	76.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78
BAROMETER, MMHG	743.5	743.5	743.0	743.5	743.0	743.0
HUMIDITY, GRAINS/LB	44	44	44	44	44	44
TEMPERATURE, F	80	79	79	78	77	77
ENGINE SPEED, RPM	1000	1000	1000	1000	1000	1000
TORQUE, FT-LB	54.0	54.0	22.5	22.5	9.0	9.0
POWER, BHP*	10.2	10.2	4.2	4.2	1.7	1.7
FUEL RATE, LB/HR	5.4	5.4	3.1	3.1	2.6	2.6
IGNITION TIMING, DEG BTDC	30.0	30.0	36.0	36.0	36.0	36.0
MANIFOLD VACUUM, IN HG	8.3	8.3	17.1	17.1	19.9	19.9
INTAKE MAN. TEMP., F	127	127	115	110	113	112
CONCENTRATIONS, DRY BASIS						
CO, %	1.1126	.0066	.3519	.0079	1.8688	.0066
CO2, %	12.46	10.52	12.08	8.06	10.49	7.53
O2, %	2.06	5.66	3.17	9.03	4.37	9.72
HC, PPMC	3330	106	2983	282	10173	125
NOX, PPM	382	191	781	369	120	40
AIR/FUEL RATIO	15.39	20.07	16.75	25.71	15.95	27.41
EMISSION RATES, G/HR						
CO	387.6	3.1	78.1	2.7	331.4	2.1
HC	58.3	2.5	33.2	4.8	90.6	2.0
NOX+	19.1	12.7	24.8	18.1	3.0	1.8
OIL TEMPERATURE, F	192	192	190	189	185	184
OIL PRESSURE, PSI	51	51	52	52	53	53
COOLANT TEMPERATURE, F	187	187	185	185	183	183
EXHAUST PRESSURE, IN. H2O	7.0	3.0	5.0	1.0	3.0	1.0
EXHAUST TEMPERATURE, F	664	518	543	437	440	374

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	77.01	77.02	78.01	78.02	79.01	79.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78
SAROMETER, MMHG	743.0	743.0	742.5	742.5	743.0	743.0
HUMIDITY, GRAINS/LB	44	44	45	45	45	45
TEMPERATURE, F	77	77	80	82	83	83
ENGINE SPEED, RPM	1000	1000	1600	1600	1600	1600
TORQUE, FT-LB	0	0	75.0	75.0	60.0	60.0
POWER, BHP*	0	0	22.6	22.6	18.1	18.1
FUEL RATE, LB/HR	2.3	2.2	10.9	10.9	9.2	9.2
IGNITION TIMING, DEG BTDC	36.0	36.0	22.0	22.0	27.0	27.0
MANIFOLD VACUUM, IN HG	21.0	21.0	5.8	5.8	8.1	8.1
INTAKE MAN. TEMP., F	119	118	98	104	126	127
CONCENTRATIONS, DRY BASIS						
CO, %	2.3210	.0062	.9125	.0081	1.0397	.0077
CO2, %	9.76	7.03	13.14	11.95	12.98	11.51
O2, %	5.00	10.41	1.48	3.88	1.61	4.61
HC, PPMC	20055	108	2606	95	2673	81
NOX, PPM	39	27	789	532	506	254
AIR/FUEL RATIO	15.06	29.28	15.16	18.00	15.18	18.74
EMISSION RATES, G/HR						
CO	341.1	1.8	630.0	6.7	602.6	5.5
HC	148.0	1.6	90.4	3.9	77.8	2.9
NOX+	.8	1.1	78.7	63.0	42.4	26.4
OIL TEMPERATURE, F	183	183	192	201	204	205
OIL PRESSURE, PSI	53	53	56	56	55	55
COOLANT TEMPERATURE, F	184	183	190	188	187	188
EXHAUST PRESSURE, IN. H2O	3.0	2.0	18.0	7.0	14.0	6.0
EXHAUST TEMPERATURE, F	393	370	967	701	946	712

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

80.01	80.02	81.01	81.02	82.01	82.02
1	2	1	2	1	2
11/30/78	11/30/78	11/30/78	11/30/78	11/30/78	11/30/78
742.5	742.5	743.0	743.0	743.0	743.0
45	45	45	45	45	45
80	80	79	79	79	79
1600	1600	1600	1600	1600	1600
25.0	25.0	10.0	10.0	.0	.0
7.5	7.5	3.0	3.0	.0	.0
5.6	5.6	4.1	4.1	3.3	3.2
36.0	36.0	36.5	36.5	37.0	37.0
17.2	17.2	20.6	20.6	21.3	21.3
113	113	106	106	108	108
1.9825	.0078	2.0687	.0070	.1920	.0075
11.76	9.81	11.36	8.24	10.66	6.87
2.46	6.69	3.10	8.91	5.14	10.71
2926	102	2034	118	5645	122
351	172	166	86	107	51
15.28	21.48	15.80	25.38	18.39	30.02
719.1	4.0	558.2	3.1	50.0	3.2
53.3	2.6	27.6	2.6	73.9	2.6
18.4	12.9	6.5	5.5	4.0	3.1
202	202	197	197	195	195
55	55	56	56	57	57
188	188	185	185	186	186
9.0	3.0	6.0	2.0	5.0	2.0
746	604	666	461	604	370

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718	83.01	83.02	84.01	84.02	85.01	85.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE						
TEST DATE	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78
BAROMETER, MMHG	740.5	740.5	740.5	740.5	740.5	740.5
HUMIDITY, GRAINS/LB	47	47	47	47	47	50
TEMPERATURE, F	79	79	81	80	80	80
ENGINE SPEED, RPM	2200	2200	2200	2200	2200	2200
TORQUE, FT-LB	79.0	79.0	63.0	63.0	26.0	26.0
POWER, BHP*	32.8	32.8	26.2	26.2	10.8	10.8
FUEL RATE, LB/HR	15.5	15.6	13.0	13.0	8.2	8.2
IGNITION TIMING, DEG BTDC	26.0	26.0	32.0	32.0	40.0	40.0
MANIFOLD VACUUM, IN HG	5.6	5.6	8.4	8.4	15.1	15.1
INTAKE MAN. TEMP., F	96	97	112	112	153	153
CONCENTRATIONS, DRY BASIS						
CO, %	9067	.0102	1.0044	.0096	1.7379	.0102
CO2, %	13.33	12.30	13.30	11.72	12.20	10.23
O2, %	1.51	3.73	1.45	4.46	2.30	6.61
HC, PPMC	2701	65	2537	78	2712	82
NOX, PPM	1260	843	1109	735	188	83
AIR/FUEL RATIO	15.19	17.81	15.11	18.56	15.30	21.13
EMISSION RATES, G/HR						
CO	876.3	11.6	813.0	9.6	900.6	7.4
HC	131.1	3.7	103.1	3.9	70.6	3.0
NOX+	177.3	140.2	130.7	106.9	14.2	8.8
OIL TEMPERATURE, F	210	212	215	216	211	211
OIL PRESSURE, PSI	58	58	57	57	58	58
COOLANT TEMPERATURE, F	189	189	188	189	188	188
EXHAUST PRESSURE, IN. H2O	36.0	14.0	28.0	11.0	16.0	5.0
EXHAUST TEMPERATURE, F	1161	931	1068	887	896	755

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER	86.01	86.02	87.01	87.02	88.01	88.02
DATA SOURCE CODE	1	2	1	2	1	2
TEST DATE	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78
BAROMETER, MMHG	740.5	740.5	740.5	740.5	740.5	740.5
HUMIDITY, GRAINS/LB	50	50	48	48	50	50
TEMPERATURE, F	79	79	78	78	81	83
ENGINE SPEED, RPM	2200	2200	2200	2200	2800	2800
TORQUE, FT-LB	11.0	11.0	.0	.0	83.0	83.0
POWER, BHP*	4.6	4.6	.0	.0	44.0	44.0
FUEL RATE, LB/HR	6.3	6.3	4.8	4.8	21.2	21.2
IGNITION TIMING, DEG BTDC	39.0	39.0	39.0	39.0	23.0	23.0
MANIFOLD VACUUM, IN HG	18.4	18.4	22.0	22.0	4.4	4.4
INTAKE MAN. TEMP., F	146	143	107	107	92	96
CONCENTRATIONS, DRY BASIS						
CO, %	2.2036	.0110	1.6185	.0091	.8936	.0102
CO2, %	11.73	9.22	12.16	8.16	13.54	12.43
O2, %	2.63	8.06	2.50	9.56	1.01	3.17
HC, PPMC	2456	99	1086	95	1415	35
NOX, PPM	64	43	102	54	1296	911
AIR/FUEL RATIO	15.32	23.35	15.69	26.26	14.98	17.34
EMISSION RATES, G/HR						
CO	885.2	6.7	505.5	4.8	1175.7	15.7
HC	49.5	3.0	17.0	2.5	93.5	2.7
NOX+	3.8	3.9	4.7	4.2	250.9	206.2
OIL TEMPERATURE, F	205	205	204	204	227	231
OIL PRESSURE, PSI	59	59	59	59	59	59
COOLANT TEMPERATURE, F	189	188	188	188	190	189
EXHAUST PRESSURE, IN. H2O	11.0	3.0	8.0	3.0	61.0	26.0
EXHAUST TEMPERATURE, F	859	640	801	530	1350	947

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J8168
+ CORRECTED FOR HUMIDITY

89.01	89.02	90.01	90.02	91.01	91.02
1	2	1	2	1	2
12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78	12/ 1/78
740.5	740.5	739.5	740.0	739.5	739.5
50	50	50	50	48	50
83	83	83	83	82	82
2800	2800	2800	2800	2800	2800
66.0	66.0	28.0	28.0	11.0	11.0
35.0	35.0	14.9	14.9	5.8	5.8
17.3	17.4	10.8	10.8	8.3	8.3
32.0	32.0	41.0	41.0	40.0	40.0
7.5	7.5	14.7	14.7	17.7	17.7
115	115	141	141	165	165
1.0772	.0100	1.4782	.0099	1.6841	.0099
12.93	11.80	12.16	10.24	12.30	9.41
1.47	3.90	2.01	6.08	1.88	7.20
2213	56	1993	92	1280	58
1291	956	358	223	82	49
15.14	18.08	15.32	20.62	15.19	22.30
1186.1	13.4	1039.2	9.4	891.6	7.8
122.4	3.8	70.4	4.4	34.0	2.3
209.3	187.2	37.1	31.1	6.3	5.7
232	232	223	223	220	220
59	59	60	60	61	61
189	189	189	189	189	189
43.0	18.0	16.0	8.0	14.0	6.0
1175	850	1017	676	1045	601

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

92.01	92.02	93.01	93.02	94.01	94.02
1	2	1	2	1	2
12/ 1/78	12/ 1/78	12/ 4/78	12/ 4/78	12/ 4/78	12/ 4/78
739.5	739.5	739.5	739.5	739.5	739.5
48	48	37	37	54	37
82	82	87	88	88	87
2800	2800	3300	3300	3300	3300
.0	.0	80.0	80.0	64.0	64.0
.0	.0	49.9	49.9	40.1	39.9
7.1	7.1	24.9	24.9	20.8	20.8
41.0	41.0	23.0	23.0	33.5	33.5
19.0	19.0	4.2	4.2	7.4	7.4
180	180	99	100	118	118
1.1790	.0102	.5677	.0054	.9323	.0062
12.61	8.75	14.02	12.53	13.26	12.06
1.83	7.98	.67	2.94	1.15	3.58
1220	54	650	11	1187	25
55	34	1387	1035	1388	1015
15.41	23.73	14.99	17.15	15.10	17.76
544.0	7.4	870.6	9.6	1220.6	9.7
28.3	2.0	50.1	1.0	78.0	1.9
3.7	3.6	297.4	259.2	272.5	220.9
216	216	242	245	244	243
61	61	60	60	60	60
188	188	189	189	189	188
11.0	5.0	86.0	38.0	62.0	26.0
1101	555	1500	1151	1334	1059

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

	95.01	95.02	96.01	96.02	97.01	97.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE	12/ 4/78	12/ 4/78	12/ 4/78	12/ 4/78	12/ 4/78	12/ 4/78
TEST DATE	739.5	739.5	739.5	739.5	739.5	739.5
BAROMETER, MMHG	37	37	37	37	37	37
HUMIDITY, GRAINS/LB	85	85	84	84	84	84
TEMPERATURE, F	3300	3300	3300	3300	3300	3300
ENGINE SPEED, RPM	27.0	27.0	11.0	11.0	.0	.0
TORQUE, FT-LB	16.8	16.8	6.9	6.9	.0	.0
POWER, BHP*	13.1	13.0	10.3	10.4	8.6	8.7
FUEL RATE, LB/HR	43.0	43.0	43.0	43.0	43.0	43.0
IGNITION TIMING, DEG BTDC	14.6	14.6	17.5	17.5	19.1	19.1
MANIFOLD VACUUM, IN HG	140	140	162	162	176	176
INTAKE MAN. TEMP., F						
CONCENTRATIONS, DRY BASIS						
CO, %	1.4284	.0059	1.1396	.0058	.8101	.0053
CO ₂ , %	12.58	10.69	13.00	9.93	13.35	9.27
O ₂ , %	1.75	5.60	1.29	6.73	1.21	7.73
HC, PPMC	1137	42	596	21	826	22
NOX, PPM	505	322	119	65	70	38
AIR/FUEL RATIO	15.25	19.95	15.11	21.46	15.19	22.98
EMISSION RATES, G/HR						
CO	1196.6	6.4	743.5	5.4	444.4	4.5
HC	47.8	2.3	19.5	1.0	22.7	1.0
NOX+	59.2	49.6	10.9	8.6	5.4	4.5
OIL TEMPERATURE, F	236	236	231	230	228	228
OIL PRESSURE, PSI	61	61	62	62	62	62
COOLANT TEMPERATURE, F	188	189	189	189	188	188
EXHAUST PRESSURE, IN. H ₂ O	29.0	12.0	20.0	8.0	15.0	7.0
EXHAUST TEMPERATURE, F	1185	893	1268	810	1292	748

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

98.01	98.02	99.01	99.02	100.01	100.02
1	2	1	2	1	2
12/ 4/78	12/ 4/78	12/ 4/78	12/ 4/78	12/ 5/78	12/ 5/78
739.0	739.0	739.0	739.0	731.5	731.5
37	37	37	37	38	38
88	88	90	90	83	83
3900	3900	3900	3900	3900	3900
75.0	75.0	60.0	60.0	25.0	25.0
55.3	55.3	44.3	44.3	18.6	18.6
29.3	29.3	24.4	24.3	15.9	16.1
26.0	26.0	34.0	26.0	44.0	44.0
4.2	4.2	7.3	7.3	14.1	14.1
97	97	119	119	124	124
4572	4047	7726	4050	10017	4092
14.19	12.86	13.74	12.45	13.28	11.10
56	2.75	88	3.27	1.44	5.41
509	9	768	16	694	20
1502	1165	1565	1133	613	423
14.98	16.95	15.03	17.42	15.28	19.60
823.2	9.8	1166.9	8.9	1005.3	12.0
46.0	9	58.3	1.4	35.0	1.3
378.4	335.0	330.7	279.8	86.3	77.5
247	247	258	258	244	244
61	61	60	60	62	62
191	191	189	189	189	189
111.0	51.0	81.0	36.0	41.0	18.0
1554	1197	1443	1140	1342	969

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718	101.01	101.02	102.01	102.02	103.01	103.02
TEST NUMBER	1	2	1	2	1	2
DATA SOURCE CODE	12/ 5/78	12/ 5/78	12/ 5/78	12/ 5/78	12/ 6/78	12/ 6/78
TEST DATE	731.5	731.0	731.0	731.0	746.5	746.5
BAROMETER, MMHG	38	38	38	38	37	37
HUMIDITY, GRAINS/LB	85	85	85	85	91	91
TEMPERATURE, F	3900	3900	3900	3900	4400	4400
ENGINE SPEED, RPM	10.0	10.0	10.0	10.0	68.0	68.0
TORQUE, FT-LB	7.5	7.5	7.5	7.5	56.0	56.0
POWER, BHP*	12.8	12.7	10.8	10.9	31.4	31.3
FUEL RATE, LB/HR	44.0	44.0	44.0	44.0	30.0	30.0
IGNITION TIMING, DEG BTDC	16.9	16.9	18.5	18.5	4.9	4.9
MANIFOLD VACUUM, IN HG	145	145	160	160	108	108
INTAKE MAN. TEMP., F						
CONCENTRATIONS, DRY BASIS						
CO, %	.7869	.0095	.6616	.0094	.5308	.0099
CO2, %	13.74	10.37	13.91	9.69	14.24	13.17
O2, %	1.04	6.40	.96	7.24	.66	2.56
HC, PPMC	471	10	297	8	516	17
NOX, PPM	161	60	88	40	1811	1222
AIR/FUEL RATIO	15.12	20.85	15.13	22.12	15.02	16.76
EMISSION RATES, G/HR						
CO	624.9	10.5	441.7	9.6	1014.0	21.2
HC	18.8	.5	10.0	.4	49.5	1.8
NOX+	17.9	9.3	8.2	5.7	482.7	365.9
OIL TEMPERATURE, F	243	243	240	240	269	269
OIL PRESSURE, PSI	62	62	62	62	54	54
COOLANT TEMPERATURE, F	190	190	188	188	192	192
EXHAUST PRESSURE, IN. H2O	28.0	12.0	22.0	10.0	121.0	56.0
EXHAUST TEMPERATURE, F	1397	909	1414	866	1558	1203

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

104.01	104.02	105.01	105.02	106.01	106.02
1	2	1	2	1	2
12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78
746.5	746.5	747.0	747.0	746.5	747.5
37	37	37	37	37	37
91	91	88	88	88	88
4400	4400	4400	4400	4400	4400
54.0	54.0	23.0	23.0	9.0	9.0
44.5	44.5	18.9	18.9	7.4	7.4
26.9	26.8	18.3	18.3	14.8	14.9
39.0	39.0	47.0	47.0	48.0	48.0
7.9	7.9	14.5	14.5	17.3	17.3
121	121	135	135	147	147
.7789	.0100	.8201	.0104	.7474	.0089
13.91	12.69	13.47	11.37	13.81	10.79
.92	3.08	1.15	4.83	.92	5.65
658	16	463	14	572	11
1683	1058	733	486	206	98
15.07	17.22	15.20	18.99	15.04	19.94
1282.2	19.0	942.9	15.0	683.6	11.1
54.4	1.6	26.7	1.1	26.3	.7
386.7	280.9	117.6	98.2	26.2	17.0
267	267	257	257	254	254
55	55	56	56	57	57
190	190	190	190	189	189
94.0	43.0	53.0	23.0	39.0	17.0
1465	1138	1416	991	1459	.949

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B

+ CORRECTED FOR HUMIDITY

107.01	107.02	108.01	108.02	109.01	109.02
1	2	1	2	1	2
12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78	12/ 6/78
747.5	747.5	746.5	746.5	746.5	746.5
37	37	37	37	37	37
87	87	86	89	91	91
4400	4400	4800	4800	4800	4800
0	0	65.0	65.0	52.0	52.0
0	0	58.4	58.4	46.7	46.7
13.1	13.1	33.4	33.4	29.3	29.4
48.0	48.0	33.0	33.0	40.0	40.0
18.6	18.6	5.1	5.1	7.6	7.6
157	157	100	100	120	120
7748	0092	5974	0099	7031	0093
13.33	10.29	13.84	12.99	13.62	12.58
1.00	6.28	.72	2.44	.82	2.75
1861	10	764	16	595	13
93	41	1843	1415	1869	1260
14.95	20.79	15.01	16.70	15.05	17.00
642.7	10.6	1241.0	22.9	1292.3	19.7
77.5	.6	79.7	1.8	54.9	1.4
11.0	6.5	534.1	458.3	479.4	370.1
250	250	253	268	275	275
57	57	56	56	53	53
188	188	190	192	190	190
33.0	13.0	133.0	63.0	110.0	50.0
1476	945	1545	1204	1512	1187

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO₂, %

O₂, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H₂O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

110.01	110.02	112.02
12/ 6/78	12/ 6/78	12/ 6/78
746.5	746.5	746.5
37	37	37
90	90	89
4800	4800	4800
22.0	22.0	.0
19.8	19.8	.0
20.0	20.0	14.8
50.0	50.0	50.0
14.2	14.2	18.1
135	135	150
.6119	.0096	.0093
13.59	11.63	10.64
.98	4.31	5.74
510	11	11
873	589	78
15.18	18.47	20.09
776.8	14.9	11.6
32.5	.9	.7
154.7	127.7	13.7
267	267	260
54	54	56
190	190	189
62.0	27.0	17.0
1480	1052	1003

ENGINE: 1978 FORD 140-CID CALIF. 3-WAY CATALYST

FUEL CODE: 7718

TEST NUMBER

DATA SOURCE CODE

TEST DATE

BAROMETER, MMHG

HUMIDITY, GRAINS/LB

TEMPERATURE, F

ENGINE SPEED, RPM

TORQUE, FT-LB

POWER, BHP*

FUEL RATE, LB/HR

IGNITION TIMING, DEG BTDC

MANIFOLD VACUUM, IN HG

INTAKE MAN. TEMP., F

CONCENTRATIONS, DRY BASIS

CO, %

CO2, %

O2, %

HC, PPMC

NOX, PPM

AIR/FUEL RATIO

EMISSION RATES, G/HR

CO

HC

NOX+

OIL TEMPERATURE, F

OIL PRESSURE, PSI

COOLANT TEMPERATURE, F

EXHAUST PRESSURE, IN. H2O

EXHAUST TEMPERATURE, F

* CORRECTED SAE J816B
+ CORRECTED FOR HUMIDITY

113.01	113.02	114.01	114.02
1	2	1	2
12/27/78	12/27/78	12/27/78	12/27/78
752.5	752.5	752.5	752.5
35	35	35	35
94	95	94	95
5000	5000	5000	5000
86.0	86.0	86.0	86.0
80.1	80.1	80.1	80.1
49.1	48.9	49.1	48.9
27.0	27.0	27.0	27.0
1.5	1.5	1.5	1.5
81	82	81	82
4.7740	4.8215	4.7740	4.8215
11.77	11.75	11.77	11.75
.26	.11	.26	.11
2358	1351	2358	1351
1232	450	1232	450
12.81	12.76	12.81	12.76
12610.0	12747.3	12612.9	12748.8
312.8	179.4	312.9	179.4
451.5	165.0	451.5	164.9
278	282	278	282
52	51	52	51
190	190	190	190
192.0	82.0	192.0	82.0
1550	1215	1550	1215

HE18.5.A34 no
NHTSA-80-24
Koehler, Don

Performance c
of automotiv

Form DOT F 172
FORMERLY FORM DC



00347925

**U.S. DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION**

**TRANSPORTATION SYSTEMS CENTER
KENDALL SQUARE, CAMBRIDGE, MA. 02142**

**OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE, \$300**

**POSTAGE AND FEE PAID
U.S. DEPARTMENT OF TRANSPORTATION
613**

